

THE dangers of an explosion of gas, such as that which occurred on the evening of the 5th inst. in Bedford Street, are not, it would seem, limited to the immediate vicinity of the accident.

At about 7 p.m. on that day I was reading in a room, which from its position at the back of the house being rather dark, required a light, when I was startled by a sudden rush of the flame from the single gas-burner upwards for about two feet—it immediately subsided, again blazed up, and repeating this a third time sank, and went out altogether.

I thought something had gone wrong in the pipe, and that the passage of the gas was interrupted, but on applying a match it ignited and burned naturally, though with a feebler flame than before.

It was fortunate that I was in the room to turn off the escaping gas, or some serious mischief might have occurred when next any one had entered the room to find gas and air mingled into an explosive compound. I found that two other gas lights in passages had been extinguished at the same time, attention having been called to them by the smell of escaping gas.

As the distance of my residence—Granville Place, Portman Square—is more than a mile from the site of the explosion, it is interesting to note the distance to which the impulse extended.

As no further disturbance occurred, and as the phenomena noted happened synchronously or nearly so with the explosion, and as the gas-pipes here are, I believe, branches of the same source of supply, I assume that what I observed and have described was in some way caused by the explosion.

Fortunately it was at an hour when the gas was not generally burning, or other accidents might have resulted. It would be interesting to know if others observed similar effects of the explosion.

July 10

J. FAYRER

The Tay Bridge

THERE are two interesting scientific questions, apart from engineering proper, which are suggested by the late inquiry, although no reference seems to have been made to them in the reports.

The first is the origin of the extraordinary flash seen at the moment of the downfall of the bridge by many spectators several miles away. It is scarcely doubtful that an impact was the only possible cause.

The second is the important question of the amount of wind-pressure which would suffice to force a train bodily off from the top of the bridge at a place where it was *not within* the girder. No strength of columns could then prevent an accident.

The flash seems to prove that the train had been blown off the rails, and had come into violent contact with the sides of the high girders. Then, and not sooner, the piers were subjected to a strain they were unable to bear.

G. H.

"Geology of the Henry Mountains"

I LATELY received, through the Home Office at Washington, a "Report on the Geology of the Henry Mountains," by G. K. Gilbert, being a portion of the "Geography and Geology of the Rocky Mountains." With the merits or demerits of this paper I am not concerned. I am not prepared, however, to pass in silence and without protest the following paragraphs, which I find at p. 76:—"Bischof attempted, by melting eruptive rocks in clay crucibles, to obtain their ratios of expansion and contraction, but his method involved so many sources of error that his results have been generally distrusted. He concluded that the contraction, in passing from the molten to the crystalline state, is greater in acidic than in basic rocks. Delesse, by an extended series of experiments in which crystalline rocks were melted and afterwards cooled to glasses, showed that acidic rocks increase in volume from 9 to 11 per cent. in passing from the crystalline state to the vitreous, while basic increase only 6 to 9 per cent. Mallet concluded, from some experiments of his own, that the contraction of rocks in cooling from the molten condition is never more than 6 per cent., and that it is greater with basic than with acidic rocks; but considering that the substances which he treated were artificial and not natural products, that his methods were not uniform, and that he ignored the distinction between the vitreous and the crystalline, of which Delesse had demonstrated the importance, no weight can be given to his results."

It would be difficult to compress into the same number of lines a greater amount of erroneous statement than is to be found in the above quotation. Bischof's results were never distrusted by geologists, by whom they were repeatedly quoted, until in my paper on the "Nature and Origin of Volcanic Energy," read to the Royal Society, June, 1872, and printed in *Phil. Trans.*, I pointed out the errors incidental to Bischof's method of experiment, and at the same time directed attention to the strange arithmetical blunder of Bischof himself, by which his deductions from his own experiments are rendered still wider from the truth.

The experiments of Delesse, which I presume are referred to, were made on so small a scale that no deduction as to the total contraction between the liquid and solid state of any rock can be inferred from them. Coming now to Mr. Gilbert's summary condemnation of my own experiments on the total contraction of basic slags from the iron-smelting furnaces of Barrow (Cumberland), an account of which is given in my paper already referred to, and printed in the *Phil. Trans.* for 1873, some of the chief results of which are to be found in p. 201, I have to remark that no other experiments on the subject, conducted on the same great scale, and with equal precautions to insure exactness, have ever been made and published. No experiments have ever been made upon the contraction of lava as flowing from a volcano and its solidification on cooling, but I have given comparative analyses of natural lavas, and shown their almost identical composition with that of the slags employed by me. It is incorrect to state that I have ignored the difference between the vitreous and crystalline condition; all the melted matter experimented on by me having, from the large bulk of melted matter, cooled in the crystalline state. Whether then any justification can be adduced for Mr. Gilbert's sweeping and unsupported statement that "no weight can be given" to the results of my experiments I leave to the judgment of men of science who have impartially read my results.

ROBERT MALLETT

London, July 7

Intellect in Brutes

THE Central Prison at Agra is the roosting-place of great numbers of the common blue pigeon; they fly out to the neighbouring country for food every morning, and return in the evening, when they drink at a tank just outside the prison walls. In this tank are a large number of freshwater turtles, which lie in wait for the pigeons, just under the surface of the water and at the edge of it. Any bird alighting to drink near one of these turtles has a good chance of having its head bitten off and eaten; and the headless bodies of pigeons have been picked up near the water, showing the fate which has sometimes befallen the birds. The pigeons, however, are aware of the danger, and have hit on the following plan to escape it. A pigeon comes in from its long flight, and, as it nears the tank, instead of flying down at once to the water's edge, will cross the tank at about twenty feet above its surface, and then fly back to the side from which it came, apparently selecting for alighting a safe spot which it had remarked as it flew over the bank; but even when such a spot has been selected the bird will not alight at the edge of the water, but on the bank about a yard from the water, and will then run down quickly to the water, take two or three hurried gulps of it, and then fly off to repeat the same process at another part of the tank till its thirst is satisfied. I had often watched the birds doing this, and could not account for their strange mode of drinking till told by my friend, the superintendent of the prison, of the turtles which lay in ambush for the pigeons.

The same friend had a couple of Hill Mynahs (*Gracula religiosa*) the most wonderful bird for mimicry which I have come across, not excepting the grey parrot of the West African coast. One of these birds, when hung out in the verandah during the afternoons, used to amuse itself by calling the fowls together, imitating the call of their keeper so well that they used to flock together under the cage, when the bird would bust out into a very good imitation of a human laugh, as if it quite enjoyed the fun of taking in the fowls. Have birds the sense of amusement? This one certainly seemed to derive gratification from the way in which it had cheated the fowls.

Roorkee, June 21

W. W. NICHOLLS

The Volcanic Dust from Dominica

SOME months ago, through the kindness of Messrs. Alexander Agassiz and S. H. Garman, some of the volcanic ashes which fell in Dominica on January 4 were placed at my disposal. On

account of the notices that have appeared in NATURE (vol. xxi. pp. 330, 372, and vol. xxii. p. 77) and in *Comptes rendus* (xc. 622-26), this note would be needless, were it not that some may regard these ashes as of recent origin.

Microscopically the material (already described by Prof. Delesse) is seen to be decomposed to a considerable extent. The materials evidently filled an old crater, and have been subjected to secondary action, so that of the original constituents only the feldspar and augite are left. The other constituents are the results of the alteration of this andesitic (probably) *débris*. No trace of recent volcanic material could be found in that examined by me. In no sense can these ashes be called a recent product; they have simply been transferred from one place to another. The transfer is recent, but the ashes have for ages been at or near the surface of the earth.

M. E. WADSWORTH

Museum of Comparative Zoology, Cambridge,
Mass., U.S.A., June 30

Large Meteor

ON Friday evening last, July 9, at 9h. 45m., I saw a very fine meteor about equal in brightness to Venus at her maximum, moving very slowly from nearly west to south-west. I did not see its origin. It passed about 4° above *Spica*, and disappeared soon afterwards, as nearly as I could estimate, in altitude 16° and azimuth 50° west of S. Its apparent course was only slightly inclined to the horizon, approaching it at an angle of about 1 in 10.

Its apparent angular velocity was about 8° in a second, its light yellowish till the moment of extinction, when it became blue and fainter, and disappeared without any sign of explosion. Its course was somewhat wavy, and the trail it left behind it very evanescent. My latitude and longitude was 51° 25' and 0° 14' W.

F. C. PENROSE

Coleby Field, Wimbledon, July 14

Ball Lightning

ON Saturday night, the 17th inst., an instance of this form of lightning came under my observation.

The day had been hot, the thermometer registering a temperature of about 71° F. in the shade during the middle of the day, which was bright and clear. In the evening, however, a curious haze or mist spread rapidly over the landscape, while the temperature had fallen to about 68° F. This haze was very much denser and more analogous to the smoke-fog of a town than I have ever observed in the country at this time of year, yet the air did not seem particularly damp or chill.

About 9 p.m. frequent flashes of sheet-lightning occurred, with rumblings of distant thunder at intervals, both of which continued more or less up to midnight, about which time, the mist having somewhat cleared off, I saw when returning home, apparently about a quarter of a mile ahead, a ball or globe of fire of considerable size descend slowly from the clouds, and when near to or touching the earth suddenly disappear, its disappearance being accompanied by two slight but quick concussions, which may have been an explosion and its echo. The fire-ball could not have been visible more than five or six seconds. I cannot ascertain that any damage was done by it.

As this somewhat rare and curious phenomenon seems to be manifesting itself at this period, accompanying the thunderstorms we are having (see NATURE, vol. xxii. p. 193), may I be permitted to suggest that those interested in electrical science should be on the alert to observe any repetition of the occurrence with its concomitant circumstances?

W. F. SMITH

Sutton Valence, Kent

E. M. F. should read Prof. Ayrton's Sheffield lecture on "Electricity as a Motive Power" (see NATURE, vol. xx. p. 568); any decent text-book—Noad's, for example—will tell of the older attempts of Jacobi to propel boats by electricity.

THE RECENT EXPLOSIONS

ALTHOUGH it is difficult to say anything new on the subject, or give instructions more effective than such as have been given over and over again, still the

recent remarkable and destructive explosions in London, Wolverhampton, and Monmouthshire seem to call for some remarks at our hands.

Two serious explosions of gas following close on each other, in the streets of large towns, announce to every one that the difficulties of supplying gas to large numbers of consumers have not been completely overcome.

The special feature in the London accident was the occurrence of a series of explosions, at first at nearly regular, and then at increasing intervals, along the gas main. The first explosion blew out the "cap" of the main with great violence; the rush of heated air, doubtless mingled with more or less gas, in the other direction seems to have carried the flame—probably by a rapidly occurring series of small explosions—to a point at which a mass of explosive gas was again reached and fired. The mass of gaseous mixture fired in the second explosion appears to have been about equal to that in the first, but towards the close of the series either the gas became much more diluted with air, or the air became much more charged with gas. It seems just possible that vibrations propagated by the first explosion passed rapidly through a gaseous medium, consisting of much air and little gas, until they came in contact with a mass of gas and air, which they threw into rapid vibration, and so caused to explode. But from the experiments of Abel and others one would scarcely expect this to occur under the conditions which—judging from the evidence given at the inquest—appear to have existed.

A second point, illustrated more markedly by the Wolverhampton explosion, is the apparent readiness with which a soil may be charged with coal-gas and retain this gas for long periods of time. The passage of such gas into drain-pipes, and perhaps even into unfilled gas-mains, seems to be of ready occurrence.

Experiments might well be instituted by the gas companies to determine the power of soils for absorbing and retaining coal gas, and secondly, the conditions of diffusion of mixtures of gas and air through the walls of pipes of different materials. If it can be shown with certainty that the valve at the junction of the main in which the explosion occurred with the Howland Street main was absolutely impervious to gas, then the explosion may almost be regarded as proving the permeability of the material of gas mains to mixtures of air and coal-gas.

The practical lesson of the explosions is that some means of certainly determining whether a gas main does or does not contain gas must be found at once, and that this means must *not* be the application of a light to an opening in the main. The foreman who applied the fatal match said that the pressure gauge showed the absence of gas in the main; but as the main contained a quantity of gaseous mixture at rest, and not flowing through the pipe, the gauge could not be expected to indicate the presence of this mixture.

It is almost amusing to read of the simple astonishment of the two foremen when the fact was announced to them that mixtures of coal-gas and air are explosive: twenty or twenty-five years' experience in gas-works had failed to teach them this fact. Yet the lives of the inhabitants in the neighbourhood of Tottenham Court Road were practically in these men's hands for the last three or four months.

With regard to the Risca disaster, of a different and unhappily more fatal kind than the former, clouds of smoke are said to have accompanied the explosion which devastated the pits soon after midnight on Thursday last (15th inst.), and we have it from the lips of a credible eyewitness that fused and coked coal-dust is found adhering to the timbers in those parts of the workings which have been already visited, though not so conspicuous as in some cases. In these respects therefore the recent explosion is only a repetition of similar events which have